

# Organic functionalization of epitaxial graphene on SiC

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A necessary step for the development of graphene-based materials with tailored properties is the functionalization of graphene<sup>[1,2]</sup>. However, the high chemical inertness of this material makes it difficult a covalent and controlled functionalization with organic species. In this work, we target to develop new strategies for controlled covalent bonding of organic molecules to epitaxial graphene grown on silicon carbide (SiC)<sup>[3]</sup> that can be used either to modify their properties or as a link for anchoring larger nanostructures.

In our experiment, graphene was epitaxially grown on a 4H-SiC(0001) substrate with n-type doping character by chemical vapor deposition (CVD) in a hot-wall Aixtron VP508 reactor. For the functionalization process, performed in ultra high vacuum, we have chosen p-aminophenol molecules that include two functional groups, amine and hydroxyl. The surfaces have been studied in-situ using several techniques as STM, LEED and XPS. Moreover, several aspects of the system have been theoretically investigated by DFT calculations. It has been demonstrated the chemical bonding of this molecule to the graphene surface via dehydrogenation of the amine group and subsequent nitrogen intercalation into the graphene network. The functionalized surfaces exhibit unchanged electronic properties with respect to that of graphene. This work paves the way to new technological applications.

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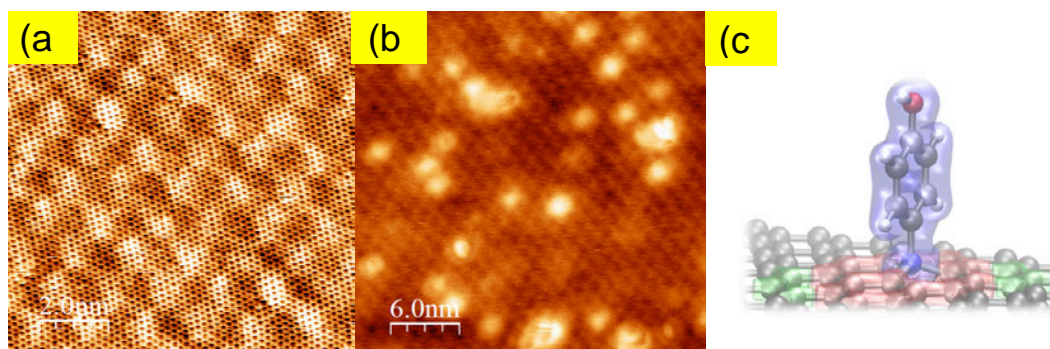


Figure 1: (a) STM image of the graphene layer before and (b) after functionalization. In b) some bumps corresponding to molecules adsorbed on the graphene layer are observed. (c) DFT calculation for the molecule on the graphene network covalently bound by a nitrogen atom.

## References

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